IN THE CLAIMS:

The text of all pending claims, (including withdrawn claims) is set forth below. Cancelled and not entered claims are indicated with claim number and status only. The claims as listed below show added text with underlining and deleted text with ~~strikethrough~~. The status of each claim is indicated with one of (original), (currently amended), (cancelled), (withdrawn), (new), (previously presented), or (not entered).

Please AMEND claim 2 and 8 in accordance with the following:

1. (Previously Presented) A three-dimensional sensor comprising:

pattern light projecting unit for projecting a slit light or a spot light onto a surface of an object;

a camera that captures images of the object, including a first image when the projecting unit does not project the slit light or the spot light onto the surface of the object, and a second image when the projecting unit projects the slit light or the spot light onto the surface of the object;

a unit determining a straight line which passes through a measuring point on the object and a specific point on said camera from the first image of the object captured by said camera;

a unit determining the surface of the object which includes said measuring point using the second image;

a unit determining a three-dimensional position of said measuring point from the straight line determined by said unit for determining a straight line and the surface determined by said unit for determining the surface; and

a unit calculating an amount of rotation of the object around said measuring point on a plane including said surface of the object by comparing a shape of the entire object or part of the object in the first image captured by said camera, with a prepared reference shape of the entire object or part of the object.

2. (Currently Amended) A three-dimensional visual sensor which performs a three-dimensional measurement of an object, comprising:

a two-dimensional information acquiring unit;

a three-dimensional information acquiring unit; and

an information combining unit, wherein:

said two-dimensional information acquiring unit determines a position of a measuring

point of said object on a two-dimensional image including said object captured by a camera, compares a reference image including a characteristic area of the object with an image of said characteristic area in said two-dimensional image and determines parameter values that describe a transformation expressing geometrical deformation with respect to said reference image provided by mapping using said camera,

said three-dimensional information acquiring unit receives a reflected light of a light projected by projecting unit onto said object by unit of light receiving unit to acquire three-dimensional information on an inclination of a surface on which said measuring point of said object exists and/or a distance from said camera to the surface, and

said information combining unit combines information acquired by said two-dimensional information acquiring unit and information acquired by said three-dimensional information acquiring unit based on calibration information of said camera and generates new three-dimensional information, by determining, in the three-dimensional space, a straight line which passes through the measuring point on said object and a specific point on said camera, and determining an intersection between said surface and said straight line based on information on said straight line and the surface on which the measuring point on said object exists.

3. (Previously Presented) The three-dimensional visual sensor according to claim 2, wherein said reflected light is received at a position of the light receiving unit which is the same as a position of the camera at which said two-dimensional image is captured.

4. (Original) The three-dimensional visual sensor according to claim 2, wherein said camera also serves as said light receiving unit.

5. (Previously Presented) The three-dimensional visual sensor according to claim 4, wherein said camera is mounted in a robot, and captures said two-dimensional information and said three-dimensional information at a same robot position, and the three dimensional visual sensor further comprises transforming unit for transforming the new three-dimensional information generated by said information combining unit into information expressed in a coordinate system of said robot.

6. (Previously Presented) The three-dimensional visual sensor according to claim 5, wherein said transforming unit acquires position information of said robot from said robot.

7. (Previously Presented) The three-dimensional visual sensor according to claim 5, wherein said transforming unit is provided on said robot and the new three-dimensional information generated by said information combining unit is transferred to said robot.

8. (Currently Amended) The three-dimensional visual sensor according to claim 2, wherein said information combining unit comprises:

means for determining, in the three-dimensional space, ~~a~~ the straight line which passes through the measuring point on said object and ~~a~~ the specific point on said camera; and

means for determining, based on information on said straight line and the surface on which the measuring point on said object exists, ~~an~~ the intersection between said surface and said straight line.

9. (Previously Presented) A three-dimensional visual sensor which performs three-dimensional measurement of an object, comprising:

a two-dimensional information acquiring unit that determines a position of a measuring point of said object on a two-dimensional image including said object captured by a camera, compares a reference image including a characteristic area of said object with an image of said characteristic area in said two-dimensional image, and determines parameter values that describe a transformation expressing geometrical deformation with respect to said reference image provided by mapping using said camera;

a three-dimensional information acquiring unit that receives a reflected light of a light projected by projecting unit onto said object, by unit of light receiving unit, to acquire three-dimensional information on an inclination of a first surface which has a certain positional relationship with said measuring point on said object and/or a distance from said camera to the surface;

an information combining unit that combines information acquired by said two-dimensional information acquiring unit and the three-dimensional information acquired by said three-dimensional information acquiring unit based on calibration information of said camera, and generates new three-dimensional information;

a unit for determining a straight line in a three-dimensional space which passes through the measuring point on said object and a specific point on said camera;

a unit for determining, from the information on said first surface, information on a virtual second surface which has a certain positional relationship with said first surface and passes through the measuring point on said object; and

a unit for determining an intersection between said straight line and said second surface.

10. (Previously Presented) The three-dimensional visual sensor according to claim 9, wherein said reflected light is received at a position of the light receiving unit which is the same as a position of the camera at which said two-dimensional image is captured.

11. (Original) The three-dimensional visual sensor according to claim 9, wherein said camera also serves as said light receiving unit.

12. (Previously Presented) The three-dimensional visual sensor according to claim 10, wherein said camera is mounted on a robot and captures said two-dimensional information and said three-dimensional information at a same robot position, and the three-dimensional visual sensor further comprises transforming unit for transforming the new three-dimensional information generated by said information combining unit into information expressed in a coordinate system of said robot.

13. (Previously Presented) The three-dimensional visual sensor according to claim 12, wherein said transforming unit acquires position information of said robot from said robot.

14. (Previously Presented) The three-dimensional visual sensor according to claim 12, wherein said transforming unit is provided on said robot and the new three-dimensional information generated by said information combining unit is transferred to said robot.

15. (Previously Presented) The three-dimensional visual sensor according to claim 2 , wherein said transformation is an affine transformation.

16. (Previously Presented) The three-dimensional visual sensor according to claim 2 , wherein said transformation is a perspective transformation.

17. (Previously Presented) The three-dimensional visual sensor according to claim 9 , wherein said transformation is an affine transformation.

18. (Previously Presented) The three-dimensional visual sensor according to claim 9, wherein said transformation is a perspective transformation.